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sea. Fifty miles further to the north, gradually rising again as we proceed, we reach the great range of hills which extends from Hamadan to Yezd, forming the boundary of the great salt desert. Its height above the sea in the part where we cross it does not exceed 10,000 feet, the summit of the pass being 8200. The ascent on both sides is gradual, descending 5500 feet to the plain of Kashan (2700), 30 miles from the crest of the pass at an almost even slope.

We now travel in a north-west direction along the narrow strip of inhabited country lying between the mountains we have just left and the salt desert, at an elevation of 2000 to 3000 feet. Crossing three isolated ranges of inconsiderable height, we reach Teheran (3350 feet), lying at the foot of the Elburz, which towers to a height of 9000 feet above it.

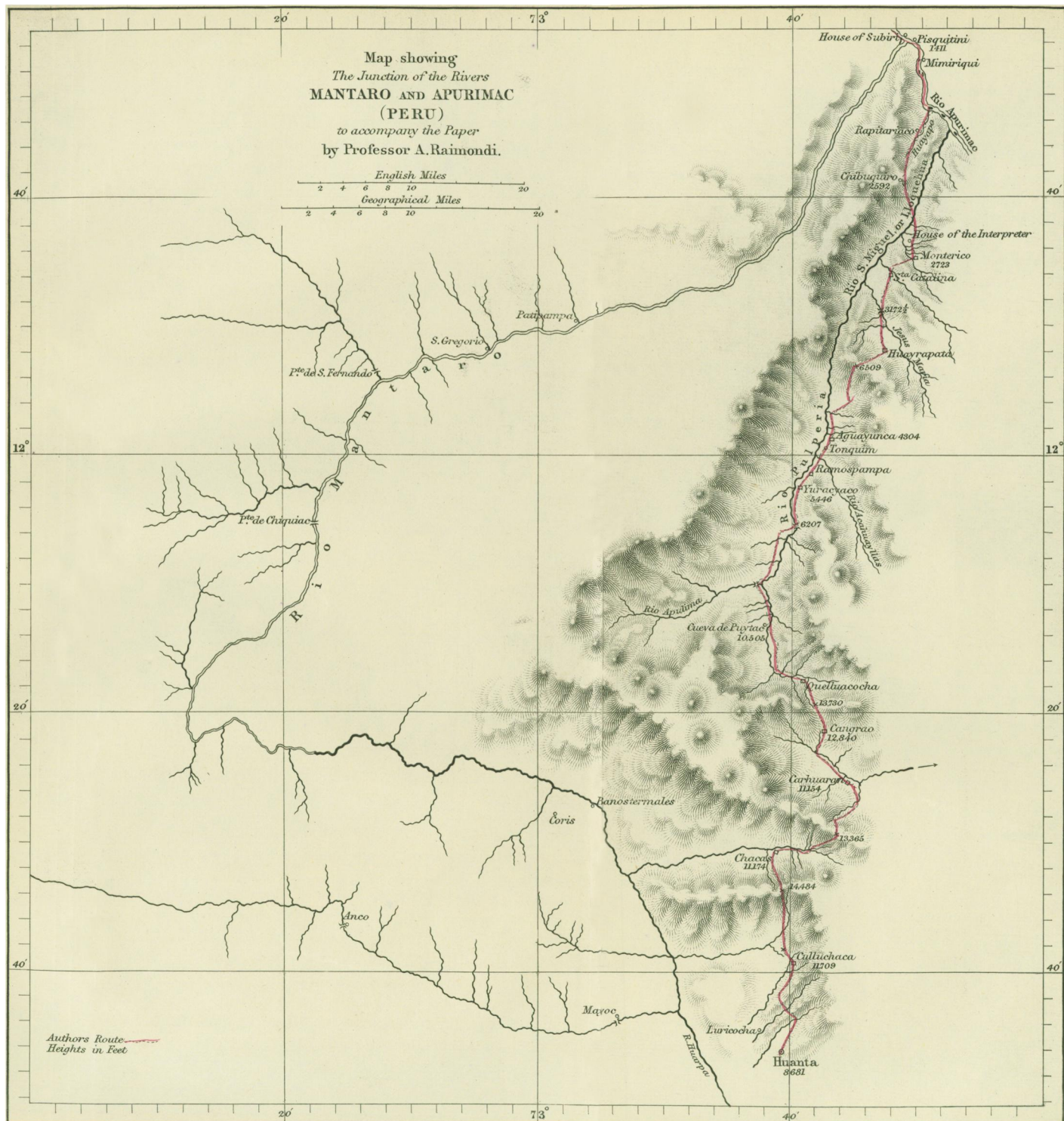
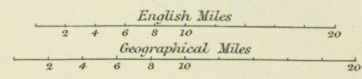
XV.—*On the Confluence of the Rivers Mantaro and Apurimac, in the Huanta Mountains.* By Professor ANTONIO RAIMONDI, Honorary Corresponding Member, R.G.S.

Read, February 8th, 1869.

As it is of primary importance, for the future prospects of Peru, to facilitate the navigation of all those large rivers of the Trans-Andean region which are tributaries of the Amazon, and thereby open out a passage to the Atlantic by that mighty river, I resolved on an expedition into the heart of the Huanta mountains, in order to become acquainted with and examine the point of junction of the Apurimac and Mantaro: the former passing through a great portion of the department of Cuzco, and the latter by Jauja and Huancayo. Many were the obstacles to the accomplishment of such a journey, there being no roads, and the parts in question being inhabited by the savage Campos or Antes tribe, the same which, in 1852, put to death the Reverend Father Cimini. Nevertheless, confiding in my seventeen years' experience of continuous travels in the interior of Peru, and in the knowledge I had acquired by numerous negotiations with the wild races on the Rivers St. Anna, Ucayali, and Amazon, I did not for a moment hesitate in carrying out my project, and, fortunately, I surmounted every difficulty.

With the view of imparting a clear idea of the region under consideration, I shall first of all briefly describe the respective sources and extent of the Rivers Mantaro and Apurimac, their confluence forming the goal of my undertaking.

The Mantaro takes its rise in the extensive lagoon of Chinchaycocha, called also the Junin or Reyes Lagoon, by the



inhabitants of the two places of like names, situate at a short distance from it. The river flows in an almost exact direction from north to south, and further down is called the Huaypacha, from the mineral district of that name which it traverses. Its next appellation is the "Oroya," on account of a suspension-bridge over it on the road from Lima to Jauja. A little further down, it directs its course towards the south-east, enters the beautiful valley of Jauja and Huancaya, and, consequently, assumes each of those names. At the end of that valley it passes under a chalk and stone bridge, near the Iscuchaca district, where it is called the River Angoyaco, and where it takes another direction, flowing downwards towards the east with but slight deviations.

Two leagues from Iscuchaca it receives the River Huanca-velica; and, passing by the towns of Anco and Mayoc, and near the district of Huanta, forms a junction with the important River Huarpa. Here again it alters its course, proceeding towards the north, north-west, and west; consequently, in an almost contrary direction, and bathing the base of the towns of Coris, Paucarbamba, and Colcabamba. Somewhat further on it returns towards the north, but finally winds along in an eastern direction, thereby surrounding, in its tortuous progress, the land peninsula which is formed by the province of Tayacaca. In the last part of its course it receives the name of Mantaro, and, passing by the eastern Cordillera in a deep and narrow ravine, enters the territory inhabited by the savages, where it forms a junction with the Apurimac.

This latter river springs from the lagoon of Villafro, at a distance of 2 leagues from the town of Caylloma, and, proceeding north-east and north, traverses the province of Canas, passing between Coporaque and Pichihua and at the foot of Checca. It then bathes the province of Paruro, running at the foot of the chief town of the same name; receives the waters of the Rivers Velille and San Tomas (which flow through the province of Chumbivilca); and then assumes a north-west direction, dividing the provinces of Paruro and Abancay from that of Cotabamba, and being augmented on its course by the River Mamara, which intersects the last-named province. Further down, its volume of water is increased by the River Pachachaca, which runs through the province of Aymaraes and a portion of Abancay. Finally, it unites with the important River Pampas (whose distant source is in the Cordillera of Castrovireyna), and after being secluded, as it were, amongst mountains peopled by savages, forms a junction with the River Mantaro.

With the view of accomplishing the projected expedition, I

left the town of Huanta on the 13th of September, 1866, taking with me a month's provisions and an assortment of knives, hatchets, fishhooks, and needles, as well as glass beads of various colours, and other articles, serving as objects of barter with the savages.

Huanta is the chief town of the province of the like name and of the department of Ayacucho. It is a regularly-built one, situate on a plain some 8681 feet above the level of the sea, and distant a league and a half from the Mantaro.

A few paces from the town I quitted the beautiful and verdant open country in order to ascend a badly-constructed road on gritstone heights, intersected by small ravines, which were watered by inconsiderable rivulets. The way bore N.N.E. and N.N.W., so that the general direction was more or less north. In these ravines one meets only with a few small specimens of the *Alnus acuminatus* and *Escallonia resinosa*, and with some shrubs of *Colletia*, *Tecoma rosæfolia*, *Kageneckia oblonga*, *Vallea cordata*, *Barnadesia spinosa*, &c. Somewhat more than a league from Huanta there are traces of porphyry rock surging up through the gritstone and appearing on the surface; and at a distance of 3 leagues from that town one comes on the mineral establishment of Culluchaca, producing a kind of argentiferous sulphate of lead, blended with antimony, and known in the country by the name of "soroche." The soil in the immediate vicinity of Culluchaca is formed of conglomerated strata and of metamorphic gritstone, having the appearance of stratified porphyry. This formation closely resembles the one in Chile, described by Mr. Darwin as appertaining to the *Upper Oolitic*.

The mineral establishment of Culluchaca is situate at 11,709 feet above the level of the sea.

The road continues to ascend from Culluchaca, and half a league from that place we reach the extremity of the small ravine which passes by it. We next leave a ridge behind us, and enter on another ravine of calcareous formation. Following up this fresh path, and still ascending towards its summit, we reach the highest point of the way, 14,484 feet above the level of the sea. The geological formation of this part appertains to the carboniferous. In the calcareous substance one perceives a few scanty products, almost identical with the *Productus semireticulatus*, and some stems of *Crinoides*. From this point the road descends, by a small ravine, to the Chacas establishment, distant 6 leagues from the town of Huanta. This establishment covers a great extent of ground, and undergoes every variety of temperature, from very mild to the coldest. The dwelling-house, which is built on the left bank of a rivulet that flows into the Mantaro, is 11,174 feet above the level of

the sea. This estate produces barley, wheat, maize, and lucern, so that a traveller may find some of his wants supplied.

From the Chacas property the road bears to the east, skirting the brook, which has to be forded a little further up: and about a league and a half from Chacas the rivulet in question is passed, and one has to ascend in a general north-east direction, treading on carbonate of lime until an elevated point (called in the country "Abra") is attained, its altitude above the level of the sea being 13,365 feet. This point serves as a line of demarcation between the waters which descend to the Mantaro and those which form a junction with the Apurimac. On arriving at the other side we experience a notable change of climate; the region now entered being very humid, and evening very frequently bringing in those dense mists which are so common in the province of Carabaya. The geological formation is also different, the slate appearing in almost vertical layers,—a species of rock which is characteristic of the Eastern Cordillera.

We have then to descend towards the north and north-east, following the right bank of a rivulet which bathes a narrow ravine. The inclined slopes of the latter are dotted with shepherds' huts. After descending a league and a half we cross the brook, and, making a *détour*, still continue the descent as far as the village of Carhuaran, which is inhabited by the independent and turbulent Iquichanos Indians.

This place has a somewhat frigid temperature, being situated on an elevation of 11,154 feet; but it presents an agreeable aspect, the huts being surrounded by groups of trees of the *Sambucus Peruvianus* and *Polylepis racemosa* species, and by some *Datura sanguinea* shrubs.

As it was my desire to approach as near as possible to the junction-point of the two rivers—which would be more or less towards the north—I did not pursue the course of the Carhuaran, as it took an easterly direction, but proceeded to reascend the Carhuaran valley and diverged to the north-east for more than a league; afterwards I crossed the river, and went up another height to the north, following a brook which flowed down by the other bank. When near its source, and on a sufficiently cold "pampa" (extensive plain), I found a few small huts for shepherds, where I was enabled to pass the night. This spot, which is called Cangrao, is 12,840 feet above the level of the sea.

On reaching Cangrao, the road—a wretched one—presents a continuous ascent as far as another "abra," at the height of 13,730 feet, and from that point the road descends to the north-east, to the rugged and broken ground of Quelluacocha,

so called from a little farm of the like name, which is about a league distant.

From Quelluacocha I took a northerly course, on the right bank of the rivulet, and along a narrow and dangerous path. Near Quelluacocha the traveller wends his way through numerous *Chætogastra* shrubs, and further on, in the declivity, appear some *Hesperomeles*, and a beautiful kind of *Ericacea*, with prettily coloured tubular flowers, appertaining to the genus *Ceratostema*. A league more or less, from the above-named little farm commences the descent, and with it a progressive increase of vegetation, so that one meets successively with the *Barnadesia polyacantha*, and with various kinds of *Rubus*, *Osbeckia*, *Chusquea*, &c.

Some two miles from Quelluacocha, the path lies on the left bank of the river, and leads to a large projecting rock, called the cave of Puytac, which affords shelter during the night.

This cave is 10,505 feet above the level of the sea. Vegetation is not of a very elevated kind, but it is sufficiently diversified by shrubs of *Chætogastra*, *Berberis*, and *Vallea*, as well as by a variety of *Ericaceæ*, *Rubus*, *Sisyrinchium*, *Lobelia*, and *Bomaria*, and a multitude of filices, mosses, and *Lycopodia*, covering all the rocks around with an agreeable verdure.

From the cave of Puytac the traveller takes a northerly direction on the left bank of the rivulet, which now descends precipitously, and soon the road itself partakes also of that character; vegetation becomes higher and more luxuriant, the shrubs give way to small trees, and the latter to those of fuller growth: at the same time the path is rendered very uneven by numerous roots serpentine on the surface of the soil, whilst the landscape varies at each step, appearing every moment more beautiful and imposing. After advancing a good league, I reached a somewhat copious river, known by the local name of *Apulima*, over which is thrown a tottering wooden bridge.

This river rolls down boisterously amongst the rocks, with a course from west to east, and from that point the road winds along to the E.N.E., and immediately afterwards to the N.N.E. After the river is passed, the road becomes worse, being stony and very abrupt in descent; and soon afterwards one encounters a series of—what may be called—stair-steps, or *échelons*, of so uneven a shape as to be impassable for any beasts with burdens, so that travellers are obliged to proceed on foot, and do the best they can to get their unladen animals over that part, with the view of making use of them in those tracts which are somewhat level. Vegetation now becomes more robust; beautiful *Begoniæ* and fuschias, as well as the *Dalea*, *Psoralea* and variegated *Aroidea* brighten up the path, whilst the *Cecropia*,

with its large parasol-like leaves, the resinous *Clusia*, with pulpos foliage, and the *Oreocallis grandiflora*, together with superb clusters of flowers, diversify the aspect of the entire landscape. After passing the Apulima, and proceeding some two leagues further on, I followed the descent of the principal river, which takes the name of Pulperia, and which is crossed by a miserable wooden bridge. The height of this spot is only 6207 feet above the level of the sea.

The road continues bad, in an almost northerly direction, and such tracts as are not formed of high stone-steps are so covered with brushwood, that it is very difficult to walk on them; nevertheless, the way, although very stony, becomes somewhat more even. After proceeding a league from the bridge we come in view of the first "casucha," or small hut of the mountain. The place is called Yuracyaco, and is situate 5446 feet above the level of the sea. Half a league further on, in a north-east direction, is another inhabited spot, known as Ramos-Pampa, where maize, yuca (*Manihot aipi*), and some clusters of sugar-cane are produced. Amongst the wild plants may be enumerated some species of *Serjania* and *Visnea*, various kinds of Philodendron, the strange-looking *Caladium pertusum* with leaves characterised by large openings or holes, the *Cascarilla magnifolia*, and a few *Calophylla*, &c.

A short distance from this place the traveller crosses the river Acahuayllas (which runs from S.S.E.), and turns, when on the other bank. After ascending a few paces he arrives at a roofed house, called Tambo de Tonquim (Tonquim Shelter); and a little further on, at another house with a convenient traveller's hut known as the Aguayunca.

Near all the *tambos* (shelters) of the Huanta mountains, the people cultivate a large kind of grass, viz., the "saylla," which serves as fodder for cattle. The *tambo* of Aguayunca is situate on the right side of the ravine, at only a few feet above the level of the river, but at 4304 above that of the sea. A little beyond Aguayunca, the river opens out a passage through a narrow gorge, so that the traveller is obliged to wend his way quite close to the water-side—for a league or so—traversing various brooks on his path; finally, on quitting the ravine, he ascends a long hill by a very difficult path, amidst thick brushwood. In various tracts, the path is furrowed and excavated by the action of the rain-water, forming a sort of causeway, with deep earthen ruts at the sides—like so many defiles—which, overshadowed as they are by the dense foliage of the large plants that intertwine their boughs and intercept the light of day, have all the appearance of subterranean mining galleries.

At last the summit of the rising ground is attained, the culmi-

nating point being 6509 feet above the level of the sea, and forthwith commences a series of *échelons*, by which the traveller continues descending, for a considerable way, in leaping fashion, directing his course towards the north-east. During the descent he perceives some tufts of purple cascarilla (*Chinchona purpurea*), and of *Bambusa*, to the latter of which the inhabitants have given the name of "sama."

After a descent of a league and a half, the Tambo of Huayrapata is reached, and further down the farm of the same name, where, for the first time, one sees the *coca* plantations. The descent is continued, on a very uneven and slippery kind of clay, and generally in a northern direction, as far as the bank of the river Jesus Maria, which runs almost exactly from s.s.e. Here the heat becomes sufficiently great—the thermometer showing a temperature of 78°·8 Fahrenheit, at 11 A.M., on the 18th of September. The elevation (taken near the river) above the level of the sea is only 3172½ feet. The way then follows the left bank of the river for about a mile, and, after the latter is crossed, winds up N.N.E. to some hillocks—the path being a very bad one, and, for the most part obstructed with vegetation. Amongst the numerous plants springing up spontaneously in this pathway, may be mentioned the *Carludovica palmata*, a variety of *Heliconiæ*, *Maranthæ*, *Alpinix*, the *Cecropia*, and the tree-nettles.

The path is also diversified by a few brooks, and some small clusters of chocolate-trees; and, after running to the extent of a league, leads to the farm of Sta. Catalina, where sugar-cane and coca are reared.

At a short distance from this spot, the way lies across a rivulet, and soon becomes a very rugged one, with continuous ascents and descents, passing through several small ravines, and near some hovels, with tobacco and coca plantations, until it leads to the farm of Monterico—a good league's distance from Sta. Catalina.

The farm of Monterico, which is situated the furthest in the interior of all, borders on the territory inhabited by the savages, and belongs to Mr. Miguel Lazon, a resident in Huanta. The dwelling-house, which is built on rising ground, a little more than half a league from the principal river, and 27 leagues from the town just mentioned, is 2723 feet above the level of the sea. This farm, which covers an extensive tract of land, laid out with coca trees, may be regarded as the largest one amongst the Huanta mountains; and I may state here that it also produces very good pine-apples.

Although not without much difficulty, beasts of burden are

brought up to this farm and employed for the transport of coca to the town of Huanta.

In the woods contiguous to the farm, I observed various kinds of *Urostigma*, which yields a milky sort of juice; also a number of *bombaceæ*, appertaining to the genera *Bombax*, *Helicteres* and *Cavanillesia*; likewise varieties of *Rubiaceæ*, of *Chinchona*, *Cascarilla*, *Genipa*, and a beautiful kind of *Warszewizia*, of the size of a tolerably high tree. When in flower, it is the ornament of these woods, with its innumerable lanceolate twigs and its red carmine colour, which give it the appearance of a bannerol or "*banderilla*," the name proper to it in this part of the country.

When this estate is left behind, the traveller's difficulties increase, for there the road terminates; and although it is anything but a good one, still it has been of advantage to him, as it saves great time being lost in opening a passage through the thickets which cover the Trans-Andean region of Peru. Despite that drawback, however, the obstacles I had to overcome were less serious than those I had encountered amongst the forests of the province of Carabaya, particularly as the ground is less rugged, and as I had the good fortune to secure the services of a trusty guide, in the person of an old Indian, whom I engaged near the farm in question, and who was not unacquainted with the woods lying on my future course. Moreover, although totally ignorant of the Spanish language, he was able to converse in Quichua, and also knew some words of the dialect spoken by the Campos savages, with whom at times he carried on a little barter, and who inhabit the adjacent territory.

And here I feel it incumbent on me to offer some advice to travellers who may be desirous of exploring those parts of Peru which are peopled by savage tribes. In the first place, they must be very cautious in the choice of a guide, particularly when he is to act also as an interpreter, because at times there is more danger in treating with an uncivilised race through him than in a direct manner. Generally speaking, such Indians as reside in the immediate vicinity of the savages carry on with them a comparatively petty but profitable traffic, giving for an *arroba* (25 lbs.) of chocolate fruits of good quality—which the savages gather in the woods where it grows spontaneously—such mere trifles as a small knife, or some other article of no intrinsic value. Now, the Indian is naturally very distrustful, and his first impression when a stranger visits those parts, is that the latter intends depriving him of his trading intercourse with the "infidels," for so the wild natives are generally called here. The result is that, if the new comer be totally unac-

quainted with their language, the interpreter, in order to rid himself of an importunate rival, will at times make them believe that the ultimate object of the visit is to carry off the women and make the men slaves, so that, excited to vengeance, they put the stranger to death. Thus the murder of the Rev. Father Cimini, amongst these very Huanta mountains, was committed at the instigation of an interpreter, and perhaps to the like cause may be attributed the assassination of Viscount d'Osery, who was attached to Castelnau's mission, and who in the year 1846 met his death at the hands of the very Indians who were conducting his canoe, in North Peru. The primary endeavour of the traveller should be to gain the confidence of his guide or interpreter, and to make him understand, in every possible way, and without raising any suspicions, that there is no intention whatever to carry on any traffic, but merely to make a collection of remarkable birds and insects, or else to gratify curiosity, by becoming personally acquainted with the people in question.

If the visitor be desirous of obtaining anything from them, he should bring with him certain objects of barter, such as hatchets, knives of various sizes, fishing-hooks, large-sized needles, and necklaces of coloured-glass beads; but it will be better to effect all exchanges through the medium of the interpreter himself, in order not to awaken any misgivings on his part. In the first place, the interpreter will make a better bargain, and in the second he will see that the stranger has not come to spoil his custom, by exchanging for certain articles others of greater value than those which the Indian traders themselves are accustomed to offer. At the same time, it will be as well for the traveller to keep a few small objects about his own person, for example the hooks and needles, and some metal buttons, in order to make presents to such of the natives as show him any particular kindness, by bringing him fruit, yucas, &c. In that way he will raise up friends for himself without any prejudice to the interpreter's interests.

Finally, in order to avoid all danger on the part of the savages themselves, he should show that he places implicit confidence in them, just as if they were old friends—give and receive edibles and drinkables, take part in their amusements, without manifesting the slightest apprehension, win the affection of their children by regaling them with little dainties, such as a piece of sugar, cakes, &c., and exciting them to catch butterflies, and to search for shells, flowers, &c. It is, no doubt, to such a plan of conduct as the foregoing that I am indebted for the avoidance of any mishap during my many travels.

Returning, however, to the narrative of my journey, I was

fortunate enough, as said before, to meet with a good interpreter, in a house near the Monterico farm, and I at once engaged him. I soon learned that the River Apurimac would be reached from that establishment in a very short time, if the course of the river could be followed, but that that way was almost impassable; consequently, I decided on proceeding along the bank of the principal river, crossing it at a certain spot, and then advancing along the other side, until I approached as near as possible to the River Mantaro, which would lie to the left. Accordingly, taking with me my guide-interpreter, and four men to carry the requisites for a few days' expedition, I left the farm of Monterico, and proceeded in a north-west direction for about a quarter of a league, when we reached my guide's house. We soon, however, resumed our journey through some cultivated grounds (his own property), and then descended as well as we could towards the level of the river, taking a northern direction. We thus advanced along its right bank, until we attained a point where the river is divided into two branches by a large boulder, but they are sufficiently narrow to admit of being crossed on the planks thrown over them. In this part the river San Miguel, or Lloquehua, is a copious and precipitate river, flowing between elevated and very smooth and slippery rocks, so that it was only with difficulty, and by supporting each other, that we got across the two arms in question. On the right side of the river, and at a short distance below the bridge, we came upon the first dwelling of the savages, inhabited by three men and two women.

We continued our journey on the other bank by a sombre height, but as there were only a few shrubs we were not obstructed on our way. For more than a quarter of a league we kept tolerably close to the river, but afterwards proceeded at a greater distance from it, taking a N.N.W. direction, the one in which, as the interpreter stated, we should find a spot inhabited by savages. Our course was now a very difficult one, the ground being uneven, and moreover, completely covered with small shrubs, several of which, for example the *Paulliniæ* and *Acaciæ*, rent our clothes, and not unfrequently our flesh, with their thick thorns, producing a painful sensation; whilst others, stretched like ropes across our path, were constantly tripping us up. Amidst this chaos of vegetation, certain species of *Marantha* and *Calathea*, extended their broad and variegated leaves around us. On a further advance, we found the ground more sloping, and the difficulties on our way increased by the brushwood. After a good league's march we saw some smoke before us at a short distance—the certain sign in these parts of the vicinity of a dwelling of savages—and, in effect, after going

about a quarter of a league further on, and just as we emerged from a thicket, we found ourselves only a few paces from a *casucha* or hut of Campos natives, with two men, two women, and several children. We met with a friendly reception, and after our interpreter had explained, as well as he could, the object of my journey, our male hosts, without moving from their seats, made a sign to their wives, who thereupon went out, but returned in a few minutes with two large pine-apples which they laid at my feet. Afterwards, they brought in a fermented beverage, prepared from Yucas, and which bears the name of *istia*, the same kind of drink that is called *masato*, in the littoral province of Loreto. I ordered the interpreter to pay in fishing-hooks for the pines and the *istia*, and on going away I presented two needles to each of the women, and some cakes to the children, at which they all seemed much pleased.

This was my first interview with the so-much dreaded savages of the Campos tribe of the Huanta Mountains, and almost all the others whom I afterwards met with received me in more or less the like manner.

The spot in question is called, in their language, *Chibuquiro*, and is situate at 2592 feet above the level of the sea.

The language of the Campos savages is a very sonorous one, and without the strong gutturals of the Quichua; in fact, nearly all the words terminate in vowels, like the Italian.

One singularity which I noted amongst the people is the total absence of that curiosity which is so common to the inhabitants of the woods in the littoral province of Loreto, and of the valley of Sta. Anna, where the traveller is surveyed from head to foot, and where the natives place their hands on his body, his dress, his buttons, and, in fact, everything that is new to them. Here, on the contrary—I know not whether designedly or through natural apathy—they bestow no apparent attention on anything; so that even when I drew out my Gay Lussac barometer, in order to take an observation, for the purpose of ascertaining the altitude, the Campos did not stir from their places, nor inquire of the interpreter what I was doing; whereas in other parts I have been not a little interrupted during my observations, as the inhabitants were anxious to touch everything they beheld.

We left Chibuquiro by a path which the Campos had opened out towards the Apurimac, and we proceeded along a hill shaded by luxuriant vegetation. After advancing along the rising ground for half a league in a N.N.E. and north-east direction, we skirted the eminence by a path not more than a yard in breadth, and with so deep a precipice on each side that a glance below sufficed to make one giddy. To the right flows the River San Miguel,

at the distance of about half a league; and to the left extends a very deep ravine, where a brook, called Huayapo, takes its rise. Whilst traversing this dangerous pass, to avoid falling we were obliged to take hold of the trees.

On quitting that point we still proceeded along uncultivated ground, but the view became gradually more extended. We next ascended another hill, for about a third of a league, until we reached the summit, which is about 3012 feet above the level of the sea. Here we were shut in, as it were, by a wood, but, on advancing a few steps further, we beheld all at once one of the most beautiful and charming of landscapes,—the sombre aspect of the forest being replaced by scenery radiant with light, and the horizon bounded by some distant hills covered with trees, near which, like a cincture of brilliants, flowed the River Apurimac. Continuing our journey we soon began to descend, and then suddenly, like the picture of a phantasmagoria, the luminous scene disappeared, and we were again plunged in the obscurity and silence of the primeval woods. The path, too, was so steep that we could scarcely keep our feet, and, as before, we were under the necessity of laying hold of the branches of the trees to maintain our equilibrium, much of the path being, so to say, affixed almost perpendicularly to the soil. Descending more or less in that kind of way for a league or so, we reached the brink of the Huayapo, a scanty brook, flowing between the folds of two hills, too steep to walk on, so that the easiest mode of advancing is to take to the bed itself of the streamlet, in thoroughly aquatic fashion. The natives, who do not make use of any kind of covering for their feet, naturally enough would prefer the water to the thickets and brushwood, where they are liable to be beset by reptiles and tormenting thorns; but as for Europeans, such a continuous promenade through water and on shifting sands is anything but agreeable.

This singular road has to be traversed for more than a league. About midway from the point at which we entered it we found another hut of savages; but the only occupants were a man, a woman, and their two children. Here we were again supplied with yuca—this time baked—for which, as in the former case, I instructed the interpreter to present some fish-hooks to our entertainers.

On leaving this place, which is called Rapiitariaco, we re-entered the brook, and resumed our aquatic march for another half-league. The ravine then spread out, and presented to our view the welcome Apurimac, flowing tranquilly on its course, and quietly, as it were, inviting commerce to navigate its waters. At this point it is some 394 feet wide—its speed being at the rate of one league per hour. It may be stated, however, that

that speed is greatly increased in some parts of its course. The depth varies considerably—in fact from 19 to 25 feet, and even more where there is but little current, down to at times less than $6\frac{1}{2}$ feet, in those parts where there are strong currents. Here the direction of the river is from east to west, but it soon veers to the north. Some two-fourths of a league higher up than the mouth of the Huayapo Rivulet, the Apurimac divides into two branches and forms an islet.

On landing, I found two other natives in a hut, and, through the interpreter, obtained as exactly as possible some particulars respecting the Mantaro; they giving us to understand that the point of junction of that river with the Apurimac was but little distant. On my inquiring whether they had any canoes, they pointed out one, but stated that it was leaky. Thereupon I examined it, but I did not care to entrust myself to it; moreover, it was very small, and only capable of holding two persons. I then distributed some knives amongst them, and, on their part, they undertook to construct a raft for the purpose of descending the Apurimac until it united with the Mantaro. Accordingly they at once set to work, by cutting down the requisite timber on the hills, whilst we prepared our camp, as we would have to make a stay of at least two or three days.

Other natives speedily made their appearance, and—just as if the word had been passed around—the number was soon augmented by fresh arrivals, so that in a short time they amounted altogether to sixteen. Thanks to the gift of a few knives, some of them assisted in the construction of the raft; some procured wood for combustion, whilst others commenced erecting a little hut, composed of the stems and leaves of the *Gynerium saccharoides*, which is found in abundance on the banks of the river. Meantime, a few offered to catch some fish for us: in fact, I never met with such willingness elsewhere to perform all I required to be done, and never shall I forget the agreeable moonlit nights I passed on the banks of the Apurimac, encircled by those so-called savages, who undertook to teach me in their language the names of all the objects I showed them or pointed out, and who indulged in immoderate but good-natured laughter whenever I pronounced the words badly.

By the following day the construction of the raft had already somewhat advanced, and those Indians who had gone out fishing came back and deposited at my feet from three to four *arrobas* (75 to 100 lbs.) of fish, so that my porters set about salting and drying a quantity to serve for other occasions. On my part, I busied myself with taking meteorological observations, looking after insects of various kinds, and collecting plants in the woods in the vicinity.

METEOROLOGICAL OBSERVATIONS on the BANKS of the APURIMAC, at a short distance from the MOUTH of the MANTARO, on the 22nd of September, 1866.

Hour.	Pscrometer.		Barometer. Millimètres reduced to 0°.	Condition of the Sky.
	Free (Centigrade).	Moist (Centigrade).		
6·30 A.M.	20·5	18·8	721·65	Sunny.
7·30 A.M.	22·0	20·8	721·55	„
8·30 A.M.	24·2	22·7	721·55	„
9·30 A.M.	27·5	26·0	721·75	„
10·30 A.M.	27·7	26·5	721·20	„
11·30 A.M.	29·5	28·2	721·00	„
12 noon	30·1	28·7	719·45	„
1 P.M.	31·0	29·6	717·75	„
1·45 P.M.	32·0	31·0	717·25	„
3 P.M.	32·4	31·7	716·50	{Sunny, reflection from the warm sand.
4 P.M.	30·0	29·6	715·60	
5·30 P.M.	27·0	26·5	715·80	Sunny.
9 P.M.	21·0	20·7	717·55	Setting sun. Moon.

It is generally admitted that, in the tropical zone, the difference between the maximum and minimum of the atmospheric pressure on one and the same day does not exceed three millimètres; nevertheless, in various parts of Peru, for example in the one now under consideration, the difference corresponding with horary variations is as much as six millimètres.

The raft was finished by the third day; and I must state here, to the honour of the constructors, that it was of very elegant form, and well made. In effect all the planks had been rendered quite white by stripping off the bark, and they were fastened together by large wooden clamps, made of black and very hard wood, cut from the trunk of a palm-tree of the *Bactris* genus. Moreover, the timbers were further secured by uprights made with strips of a very tenacious bark, cut from the *Bombacea* or *Urostigma*. The fore-part of the raft tapered more or less to a point, like the stem of a vessel, for the purpose of making way through the water with greater facility—a contrivance of which even the civilised Indians of the north of Peru do not avail themselves.

As the raft was somewhat too small to convey the entire party, only myself, the interpreter, and three of the natives of the place, embarked on it.

Two of the latter were to conduct the craft, whilst the third one took charge of the comparatively more valuable portion of my little cargo, which was deposited in a small well-caulked sort

of cabin. As for the porters I had brought with me, they were to remain behind and await our return. After these arrangements had been made, we commenced floating down the current of the Apurimac in quest of the Mantaro.

Many portions of the former river are characterised by smooth pools, so that the water appears stagnant, as in lagoons; but in other parts it rolls boisterously along over a bed of stone. At times our raft would make a plunge and be for a moment under water, immersing as it were in a bath, but of so light a nature were the materials of construction, that it rose immediately to the surface like a cork.

We passed a few little islands and beach-like banks, where we saw some small huts, but no signs of any habitations, as the savages do not live on the banks of rivers, but generally at some little distance in the interior. At intervals we had an alternation of apparently stagnant parts and strong currents, so that, in the course of one hour, we passed nine rapids, some with a heavy surge. We kept to the middle of the river, as there was much water there; but at times we could see ridges of small stones at the sides, along which the waters rushed tumultuously and furiously.

We had thus continued for some two hours, when all at once one of my companions exclaimed, in his own language, "Behold the Mantaro!" and he then pointed to a muddy river on our left which flowed with no little speed into the Apurimac. Thereupon we approached it, and finding it a copious stream, concluded at once that it could be no other than the former river, as stated. In fact, all the other rivers in these parts are very-small ones, and always limpid. A few paces further down we met with two other arms, and soon afterwards a third one; but the wild natives who dwell on the bank opposite the mouth of the Mantaro stated that the number of outlets varied—there being sometimes only two, and at other times more than three, according as the waters of that river increased or diminished.

In order to ascertain more exactly the point of junction with the Apurimac, we descended a little further towards the north-west, but contrived to float along the waters of the Mantaro, which—although there is now only one river—are easily distinguishable, for a comparatively long distance, by their slimy colour, as those of the Apurimac still continue transparent. Soon afterwards we landed, and proceeded along the dry bed of a brook for half a league, in order to examine the principal arm a little higher up.

The River Mantaro, near its mouth, is much more rapid than the Apurimac; but a little further up it is also apparently stag-

nant in some parts. The inhabitants of the vicinity stated that a canoe could only ascend it some six or seven leagues from the outlet,—that is to say, to a point which they called Masangaro, beyond which the stream is obstructed by rocks.

The Apurimac is known under the name of the “Catongo” to the Campos savages, who inhabit this region. The latter appellation signifies in their language “beyond”—“beyond river;” because they navigate it to a point beyond Simariba, a trip which is performed in about five days. At the time of my visit, —and it happened to be the driest season of the year—the river had sufficient water to be navigable by large canoes. There are some rapids here and there, but they are not particularly dangerous, as the natives who dwell near the banks daily pass up and down the river, much beyond Simariba, although their canoes are respectively formed only of the trunk of a tree. When they descend the stream they keep to the middle, and when they row against the current they creep along the banks and amongst the little arms of the river which form numerous islands disseminated on their track. In ascending the river much exertion is at times required, as the water of the little channels which the natives enter is here and there so low, and so very shallow over the stony beds, that they are obliged to get into the water and pull the canoes bodily up a species of inclined plane.

During the rainy season the force of the current considerably increases, and at that time it is impossible for the canoes to ascend the river, so that it is only navigated in the dry season. I am convinced, however, that small barges would be able to navigate the large arms of the river, even in the latter season.

A little beyond Simariba one meets with the wild natives along the entire course of the Apurimac, but never in any large number, there being only small huts here and there, containing one or two families.

The river which is thus formed by the junction of the Mantaro and “Catongo,” or Apurimac, is called the *Ene*. Even in the dry season it has sufficient water to admit of the use of small steamers,—the more so that, a few leagues further down, it is augmented by the junction of the Perene, a somewhat important stream formed by the Chanchamayo, Tutumayo, and Pangoa Rivers.

Opposite the mouth of the Mantaro extends a plain about a league in width, inhabited by a family of savages, under a chief named Subiri—the tallest man I ever met with amongst the wild natives, as he is six Spanish feet in height. He is the owner of a large canoe, in which he is accustomed to descend

the stream as far as the River Tambo, which is a large tributary of the River Ucayali, and which is formed by the junction of the Ene and Perene. Sometimes Subiri navigates the last-named river as far up as the vicinity of Chanchamayo. I was informed by him that the Tambo presents no obstacle in the way of navigation, so that if a regular service were established on the River Ucayali, a passage inland could be effected, by means of the Tambo and Ene, as far as the junction of the Rivers Mantaro and Apurimac—a distance of 32 leagues from the town of Huanta.

METEOROLOGICAL OBSERVATIONS taken in the dwelling of the before-named SUBIRI, opposite the point of Junction of the RIVERS MANTARO and APURIMAC.

Month and Day.	Hour.	Pslcrometer.		Barometer (Gay Lussac) in Millimètres reduced to 0°.	Sky.	Observations.
		Free Centigrade.	Molst Centigrade.			
September.						
23	9·30 A.M.	27·1	26·5	722·20	Sunny	The house of Subiri is situated from 2 to 3 mètres above the level of the river.
23	11·45 A.M.	31·2	30·0	721·10	,,	
24	9·0 A.M.	21·8	21·0	722·60	,,	
24	10·0 A.M.	26·5	25·4	722·10	,,	

Taking the average of the foregoing observations, the altitude of the place in question is 1417 feet, and deducting from same the height of Subiri's house above the level of the river, we find that the altitude of the point of junction of the two rivers is about 1411 feet.

ANTONIO RAIMONDI.

Lima, May 19, 1867.

XVI.—*The Jaxartes or Syr-Daria, from Russian Sources.*

By ROBERT MICHELL, F.R.G.S.

IT is not more, I may say, than ten or twelve years ago that the Jaxartes (or Syr-Daria as it is styled in the vernacular of Central Asiatics and by the Russians) was generally believed to have issued together with the Oxus or Amu-Daria from the Lake Sary-Kul, on the Upland of Pamir, between 73° and 74° of E. longitude from Greenwich, and in about 39° of N. latitude. But this is not astonishing. If we refer to the general geography of Asia, as it was understood five or six years ago, we shall be